

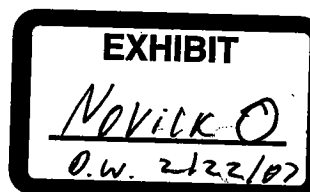


EXHIBIT 16

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|  | MOBIL CONTINUOUS IMPROVEMENT CONFERENCE |
| <p>BEST PRACTICE SHARING: REMEDIATION BY NATURAL ATTENUATION (RNA)</p> <p>NORM NOVICK</p> | |
| <small>Remediation Services Remediation Continuous Improvement Conference • March 10-12, 1998</small> | |

| | |
|--|----------------------------|
|  | BEST PRACTICES: RNA |
| <p>■ WHAT IS RNA?</p> <ul style="list-style-type: none">• Remediation by natural attenuation is a site remediation practice whereby naturally occurring processes (physical, chemical, biological) achieve remedial goals without human intervention other than monitoring.• The practice involves development of technical evidence to demonstrate that contaminant mass and concentration in soil and groundwater will safely decrease over time due to biodegradation, dispersion, dilution, sorption and volatilization. | |



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BEST PRACTICES: RNA

■ WHY IS RNA A BEST PRACTICE?

- It can substantially reduce site costs while maintaining protection of human health and the environment.
- Use of RNA as part of an overall corrective action program allows for the redirection of funds and efforts to sites requiring active remediation
- RNA may be used within a risk-based corrective action (RBCA) analysis to more accurately estimate the potential for receptor impacts.

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■ WHAT NEEDS TO BE DONE TO IMPLEMENT RNA?

- The primary line of evidence requires historical constituent of concern data and is based on an analysis of measured hydrocarbon concentrations over time to define the plume as stable, shrinking or expanding.
- Secondary lines of evidence include estimates of natural attenuation rates and geochemical indicators of naturally-occurring biodegradation.

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- Benzene plume studies in California by Lawrence Livermore National Laboratory (LLNL) and in Texas by University of Texas Bureau of Economic Geology (BEG) indicated that most plumes are <275 ft. and are either stable or shrinking.
- MTBE plumes are now being assessed by both LLNL and Texas BEG and some initial results are in.

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- **LLNL MTBE PLUME STUDY PRELIMINARY CONCLUSIONS**
 - Benzene plume length is not a good indicator of MTBE plume length
 - MTBE plumes at 70 ppb vary from approximately 0.26 to 2.6 times the length of benzene plumes at 1 ppb
 - 93% of 20 ppb plumes and 95% of the 70 ppb analyzed in study (47 plumes) extend less than 400 ft.
 - MTBE plumes on average are younger than BTEX plumes, thus, future assessments may find size differential greater.
 - MTBE data base is small (47 plumes), a larger data base is necessary for a more accurate assessment.

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BEST PRACTICES: RNA

- **WHAT ARE SOME KEY ISSUES TO CONSIDER PRIOR TO IMPLEMENTATION?**
 - Timeframe
 - Source Control
 - Oxygenates

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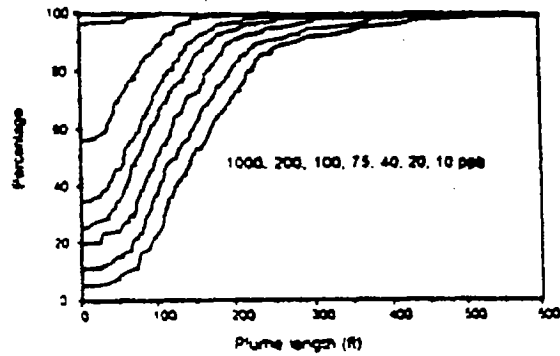
- **RNA and OXYGENATES?**
 - MTBE, TAME and TBA are typically considered to be less biodegradable than BTEX, however:
 - Microbial consortia exist that can completely biodegrade MTBE (Shell, AMOCO, Notre Dame and Rutgers Activated Sludge Studies)
 - Some studies indicate that MTBE can be biodegraded in groundwater (University of Waterloo Study, NC State Study, Texas BEG/LLNL Plume Studies)
 - The applicability of RNA to plumes containing oxygenates should be assessed in same manner as for pure BTEX plumes (i.e., apply lines of evidence)

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BEST PRACTICES: RNA

TEXAS BEG RESULTS: BENZENE PLUME LENGTHS



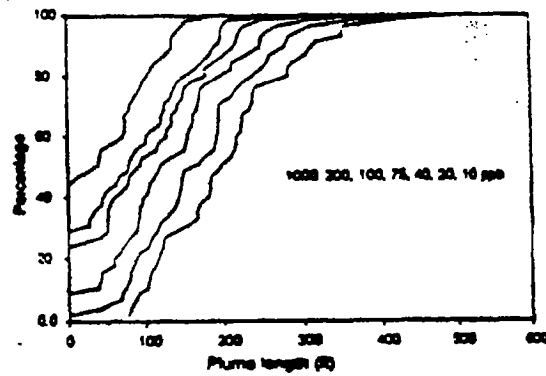
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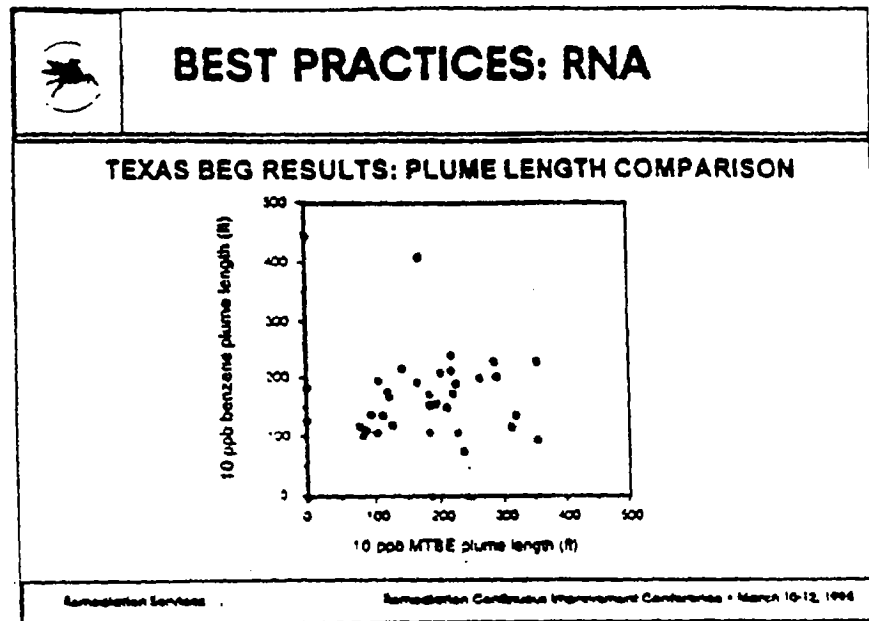



BEST PRACTICES: RNA

TEXAS BEG RESULTS: MTBE PLUME LENGTHS



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 **BEST PRACTICES: RNA**

■ **CONCLUSIONS FROM BEG PLUME STUDY:**

- MTBE plumes are (on average) 75 feet longer than benzene plumes
- There is much more variability in MTBE plume lengths than in benzene plume lengths. As expected, this may indicate that MTBE plumes are "younger".
- Some initial evidence that some plumes are stabilizing within relatively short distances of source

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BEST PRACTICES: RNA

- A conclusion from the plume studies may be that natural attenuation mechanisms are acting on MTBE plumes as well as benzene plumes to restrict plume length and stabilize and shrink plumes, therefore:
 - The applicability of Remediation by Natural Attenuation to plumes containing oxygenates should be assessed in same manner as for pure BTEX plumes (i.e., apply lines of evidence as described in last slide references).
- Next Steps: (1) More temporal data on plumes must be analyzed (LLNL & BEG), (2) Educate remediation engineers, consultants, States on RNA and MTBE plumes.

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■ Guidance Documents

1. A Practical Approach to Evaluating Intrinsic Bioremediation of Petroleum Hydrocarbons in Groundwater, 1995. Groundwater Technology Group, Environmental Health and Safety Department and Environmental Health Risk Assessment Group, Stonybrook Laboratories, Mobil Oil Corporation.
2. Standard Guide for Remediation of Groundwater by Natural Attenuation at Petroleum Release Sites. February 4, 1997, American Society for Testing and Materials, Philadelphia, PA.
3. A Tiered Approach to Demonstrate Natural Attenuation of Petroleum Hydrocarbons in Groundwater, 1995. Norman J. Novick, R. Edward Payne and J. Gregory Hill, Mobil Oil Corporation and T. L. Douthitt, Land Tech Remedial, Inc.
4. An Evaluation of Field Methods for Measuring Indicators of Intrinsic Bioremediation of Petroleum Hydrocarbons in Groundwater, 1995. R. Edward Payne and Norman J. Novick, Mobil Oil Corporation and Timothy L. Douthitt, Jeffrey A. Brown and Donald H. Anderson, Land Tech Remedial, Inc.

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